

# Appendix F-2

## U.S. results from Human Factors Questionnaire

### SUMMARY OF RESULTS FROM USA DRIVERS

### HUMAN FACTORS STRUCTURED INTERVIEW QUESTIONNAIRE

#### SECTION A: ALERTNESS & FATIGUE MANAGEMENT TRAINING COURSE:

**Instructions to drivers for Questions 1 through 7:** Using the *five point scales* below, please circle the numbers to rate the “Mastering Alertness and Managing Driver Fatigue” training course you received from Dr. Krueger before participating in the testing.

#### Rating scale from 1 to 5 (used for questions 1-6)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Disappointing/ Confusing</b>	<b>Of low value/ Not helpful</b>	<b>Neutral/Take it or leave it</b>	<b>Good/ Helpful</b>	<b>Very helpful/ Applicable</b>

**Q. 1. Material/content in the course.**

Mean rating following the **No Feedback Condition** = **4.50** (n = 12)

Mean rating following the **Feedback Condition** = **4.33** (n = 12)

**Q. 2. Knowledge gained from course.**

Mean rating following the **No Feedback Condition** = **4.67** (n = 12)

Mean rating following the **Feedback Condition** = **4.50** (n = 12)

**Q. 3. Applicability of course to my lifestyle.**

Mean rating following the **No Feedback Condition** = **4.25** (n = 12)

Mean rating following the **Feedback Condition** = **3.75** (n = 12)

**Q. 4. The lessons learned will help me in my job.**

Mean rating following the **No Feedback Condition** = **4.33** (n = 12)

Mean rating following the **Feedback Condition** = **4.17** (n = 12)

**Q. 5. I used some of the lessons learned during these past 2 weeks.**

**No Feedback Condition:**      Yes = 10      No = 2      no answer = 0

**Feedback Condition:**      Yes = 10      No = 2      no answer = 0

**Q. 6. The lessons learned will be put into practice by me in the future.**

**No Feedback Condition:**      Yes = 10      No = 2      no answer = 0

**Feedback Condition:**      Yes = 10      No = 2      no answer = 0

Q. 7. Please write your general comments about the ALERTNESS & FATIGUE MANAGEMENT TRAINING course. The material. It's usefulness to you. Things you might want changed or improved, etc.

**Comments summarized from 8 Drivers**

**Driver:** This course will be very beneficial to all who take it. It will make them aware of the need for proper rest and the need to take care of themselves physically.

**Driver:** I thought it was a very good course. Most of the things that were taught I already knew.

**Driver:** I learned a lot about sleep levels.

**Driver:** Information very useful.

**Driver:** I enjoyed it very much. But most of what was covered I had already studied or read about, and have already been practicing. The thing I learned the most about was the circadian rhythms.

**Driver:** The knowledge of fatigue & the concept of the circadian rhythm is helpful.

**Driver:** I wouldn't change anything about the course.

**Driver:** Not a whole lot to change. Good program.

**Driver:** The SleepWatch made me aware of amount of sleep. – The reaction test was often frustrating. So, course improvement would be to provide more info on how to get better sleep.

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**SECTION B: SLEEPWATCH WRIST MONITOR**

**Questions 8 through 18, instructions to drivers:** Please rate the SleepWatch Wrist Monitor, a personal sleep management tool meant to help you enhance your alertness for driving. Base your ratings on everything you did or experienced using the equipment during the several weeks you participated in our project.

**Q. 8. Approximately what percentage of the time (24/7) during these past 2 weeks, while you participated in the study, did you wear the SleepWatch?**

**Summary of results:** All 12 drivers indicated they wore the SleepWatch between 90 and 100% of the time the entire 4+ weeks we asked them to wear it 24/7. The debrief interviews recorded occasional lapses in compliance, as did the actual data themselves.

**Q. 9 If you did not wear the SleepWatch continuously, (i.e. almost 100% of the time) what were some of the circumstances surrounding when you did not wear the SleepWatch?**

**Summary results:** There were a variety of reasons given as to when and why drivers might have had the SleepWatch off their wrists from time to time. A representative sample of their explanations follows:

**Drivers:** Most drivers indicated they occasionally took the SleepWatch off their wrist for about a ten-minute shower; one for a bath; and one took it off to work with auto parts cleaning fluids.

**Driver:** I took it off during a lunch date.

**Driver:** I took it off one afternoon while sleeping for about five hours.

***Q. 10. Was it bothersome to have the SleepWatch Monitor continuously on your wrist?***

**Summary of results:** A total of 4 drivers (33%) during No Feedback condition and 6 (50%) drivers in Feedback condition wrote “no” in answer to this question. Examples of responses from the drivers (8 or 66% who answered “yes” in the No Feedback condition, and 6 (50%) who answered “yes” in the Feedback condition follow (more than 1 comment came from multiple drivers):

**Driver:** Yes. Perhaps the band made it uncomfortable – having to wear it to bed was sometimes uncomfortable.

**Driver:** Yes. Only because the plastic band makes you sweat too much.

**Driver:** Yes. It stopped keeping time, so then it became bothersome.

**Driver:** Yes. I don’t like confinement when I sleep -- any jewelry, watches, or clothes.

**Driver:** Yes. I had to reset the watch every 2 to 3 days because it did not match our company time clock. The SleepWatch lost 30 or so seconds every two to 3 days.

**Driver:** Yes. It was not comfortable while sleeping. I wanted to take it off while sleeping. (four drivers indicated this preference). One said: it was only bothersome while sleeping.

**Driver:** Yes. It was sweaty and sticky while sleeping.

**Driver:** Yes. Sometimes the SleepWatch would show a higher number for a nap than for a full sleep. (Driver indicated he would get a good 4-6 hrs sleep, but the SleepWatch would read P=80-85; then after a nap, the P value would peak to the low 90s.)

**Driver:** I got used to it but the band was aggravating at times. The excess band came out of the sliding loop – adjusting it going down the highway was bothersome. The watch gave me a rash on my wrist.

**Driver:** Yes. The Watch chapped my arm.

**Driver:** Yes. It feels bulky and too large (thick), and it kept hitting or bumping things.

**Driver:** No. But, it does not keep very good time. It needs a date and day on it.

**Rating scale from 1 to 5 (used to answer question 11)**

1	2	3	4	5
Strong dislike/ Needs much improvement	Not satisfactory/ It needs some improvement	Neutral opinion about it	It's helpful/ It was okay	Very helpful/ I liked it

**Q. 11. The SleepWatch numerical rating mirrored the way I felt.**  
Mean rating following the **Feedback Condition = 3.50** (n = 12)

**Q. 12. SleepWatch provides useful information for managing a person's sleep schedule**

**Summary of results:** A total of 5 drivers (42%) during the Feedback condition wrote "no" in answer to this question, 6 (50%) wrote "yes," and one driver left it blank.

**Q. 13. Did you like the SleepWatch scale of alertness (e.g. 1 to 99)?**

**Summary of results:** A total of 10 drivers (83%) during the Feedback condition wrote "yes" in answer to this question, the remaining 2 (17%) wrote "no".

**Q. 14. Can you suggest a better way to display the SleepWatch information?**

**Comments summarized from several Drivers**

**Driver:** It does reveal to you that you are getting emptied of your energy and alertness – a reminder to get charged back up with more sleep.

**Driver:** I didn't fully understand its function in relation to the amount of sleep.

**Driver:** It didn't seem to be in tune with what I was really doing.

**Driver:** It needs a back light.

**Q. 15. SleepWatch information provided was helpful supporting my sleep planning/managing alertness during the past 2 weeks**

Mean rating following the **Feedback Condition = 3.08** (n = 12)

**Q. 16. I would like a SleepWatch for myself?**

**Summary of results:** A total of 6 drivers (50%) wrote “no” and 6 drivers (50%) responded “yes” in answer to this question. Selected comments follow.

**Driver:** No. It’s function would be good to study any sleep habits but not for extended time.

**Driver:** No. It wouldn’t change my habits to where it would be needed.

**Driver:** No. It would not change the amount of rest I get.

**Driver:** Yes. With improvements – a light, military time, a better band.

**Driver:** Yes. Although bothersome while sleeping -- overall I like the watch.

**Driver:** Yes. It could be useful when your are real tired to get you off the road.

**Driver:** Yes. Wearing the watch actually showed myself how tired I was getting toward the end of week. Made myself more aware of the sleep deprivation I was getting.

**Q. 17. I would recommend SleepWatch to fellow drivers.**

**Summary of results:** A total of 7 (58%) drivers responded “yes” to this question, 4 (33%) responded “no,” and one driver left the question blank. Selected comments follow.

**Q. 18. What suggestions do you have on how to improve the SleepWatch to make it more useful for truck drivers?**

**Driver:** It has to be more accurate with nighttime drivers. The scale would go up even if I hadn’t slept.

**Drivers:** Downsize it, make it thinner; it needs a light. Improve the style.

**Driver:** Make it thinner, put a light on it; maybe some type of tone when it drops to level of personal fatigue. If you feel tired or worn out in the P=60 range, a tone could sound.

**Driver:** It should be more round, do away with the edges; it should have a night-light added to it (indigo light), and it should be able to handle shallow amounts of water.

**Driver:** Instill in drivers the fact that as soon as you get up from sleep our bodies are discharging energy. Therefore alertness and reactions begin to slow down.

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**Driver:** Buttons on the wrist monitor are easy to push button accidentally. Time in seconds should be on sides; There is no light, and it needs one.

**Driver:** SleepWatch should be more round. I have to wear it on the backside of my wrist when going into pockets. It catches on the pockets.

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### **SECTION C: SAFETRAC WINDOW MOUNTED CAMERA AND LANE TRACKING DISPLAY**

**Questions 19 through 32, instructions to drivers:** Please rate the **SafeTRAC Window Mounted Camera and Lane Tracking Display**.

**Answer Q.s on the SafeTRAC System based upon monitoring your driving within the lanes, etc.**

**Q. 19. The SafeTRAC camera position in the windshield distracted me?**

**Summary of results:** All 12 drivers (100%) wrote “no” in response to this question. Examples of responses from follow:

**Driver:** No. I had a hard time seeing it.

**Driver:** No. I didn’t even notice it mounted on the very top of the windshield and it did not interfere with visibility at all.

**Driver:** No. It’s a good spot to locate camera; I forgot it was there.

**Q. 20. The SafeTRAC system was easy to adjust**

**Summary of results:** A total of 7 drivers (58%) responded “yes” to this question, 5 drivers (responded “no”, or “not applicable” because they did not manipulate the SafeTRAC controls.

**Experimenter’s notes:** *Throughout the 4-week study, we asked the drivers not to make any adjustments to the SafeTRAC controls. The SafeTRAC system provides a user with a set of procedural and sequential steps which necessitate making sequential pushbutton steps on the volume control knob to set several preferential tolerance parameters of when it would “beep” to alert the driver that his/her truck tires had crossed a road lane line, and to set some limits on the volume of the beeps. Presumably an owner of the SafeTRAC system would become familiar with these control parameters and know how and when to make such preferential adjustments.*

*However, for experimental control, to ensure all drivers were obtaining similar SafeTRAC*

*feedback in this study, we asked the drivers not to make adjustments. And we did not give them the instruction sheets on how to set the SafeTRAC parameters, nor train them to do so. We set it up one way and expected the drivers to leave those settings alone. The thinking was that out on the road we would have no way of determining what settings the driver was using and when; and also there would be no way to ensure the driver reset the controls for dynamically changing road conditions.*

*This experimental control provision proved to be somewhat problematic, because the drivers expressed numerous complaints about the SafeTRAC parameters being too sensitive. It “beeped” at them at them much more frequently than it should, especially when on narrow or 2 lane highways, where the painted road lane lines were closer together than they are on interstate highways. Unfortunately, from time to time, for some drivers this beeping also occurred during the “no feedback” condition, during a time when they drove it without benefit of the SafeTRAC lane position display because it was shrouded over, but they occasionally heard beeps.*

*In subsequent experimental work with the SafeTRAC the conditions of driver control over the beep, volume, and display parameters will have to be thought out much more carefully in experimental design and procedural set up.*

*During the study, there were several instances when both the drivers and the experimental assistants were not sure the SafeTRAC system was properly set for presentation of the sound (“beep”) or if it was calibrated properly. At times, the SafeTRAC mounting and calibration came into Q., while the driver and truck were out on the road. We had to await the driver returning to the home station for frequent checkouts of the SafeTRAC system.*

*In this study the FMT systems were always “on” when the truck was Power up; so for example the FMT devices, like SafeTRAC had power on while a driver slept with the truck power turned on.*

## **21. Use and location of SafeTRAC controls were good?**

**Summary of results:** A total of 9 drivers (75%) responded “yes” to this question, the remaining 3 drivers (25%) answered “no”. Selected representative comments from drivers follow.

### **Comments summarized from 3 Drivers:**

**Driver:** No. SafeTRAC was too far from driver’s view.

**Driver:** No. Need to be somewhere other than dashboard.

**Driver:** No. You could possibly design a smaller unit; make it adjustable as well as provide a little more tolerance as far as the roadway.

## **Q. 22. Operation of SafeTRAC was consistent and understandable?**

**Summary of results:** A total of 7 drivers wrote “yes” in answer to this question. The remaining 5 drivers responded “no”.

**Comments summarized from Drivers:**

**Driver:** Yes. It seemed to be accurate as to my driving performance.

**Driver:** No. It would not work if lines were faded. Picked up tar patch instead of line and it beeped me.

**Driver:** No. Often it seemed not to track correctly.

**Driver:** No. Had to ride on the line on the right side of highway for the scale to show that I was in the middle of the lane (it seems this SafeTRAC was not properly calibrated).

**Driver:** No. It didn't work in rainy weather. The display would show four solid bars.

**Driver:** No. It did not work on wet pavement; it did not work in Indiana, or in construction, with red far lines.

**Q. 23. The SafeTRAC numeric display could be read easily?**

**Summary of results:** A total of 10 drivers (83%) responded "yes", that the numeric display could be easily read, and 2 drivers (17%) responded "no."

**Comments Summarized from 2 Drivers who responded "no" :**

**Driver:** No. I would have liked this monitor in front of me rather than to my right side.

**Driver:** No. It was hard to see; it should be in front of the driver.

**Q. 24. SafeTRAC's numeric indicator (1-99) frequently got my attention while driving?**

**Summary of results:** All 12 drivers (100%) responded "yes" to this question.

**Comments summarized from Drivers:**

**Driver:** Yes. I found myself competing to get the highest numerical tally. The SafeTRAC was not on for a long time until two days ago Thursday. It did not work in the rain at times. This alarm was very annoying when it went off unjustly ...

**Driver:** Yes. It would be helpful in driver training.

**Driver:** Yes. To much, did much better when I didn't look at it. And it didn't work in the rain.

**Driver:** Yes. When very tired, it let you know. It is a good product.

**Driver:** Yes. It made me more aware of my road position.

**Driver:** Yes. The highest score I could get was 98. It seems that the higher the number, the harder it was to move up a point.

**Driver:** Yes. SafeTRAC device helped me see how much I swerved while driving fatigued. I definitely need more rest in my day.

**Driver:** This test made me aware of how much I have been correcting my steering while driving from Hermitage PA to Angola, Indiana. I need good quality sleep to perform my job safely.

**Rating scale from 1 to 5 (used for questions 25 through 27)**

1	2	3	4	5
Strong dislike/	Not satisfactory/	Neutral	It's helpful/	Very helpful/
Needs much improvement	It needs some opinion improvement	I like it I'd Use it about it		

**Q. 25. SafeTRAC's *crossing the lane* alert feature could be trusted**  
Mean rating following the **Feedback Condition** = 3.25 (n = 12)

**Q. 26. Displayed information provided was reliable; the display usually accurately depicted my driving with regard to tracking the lanes on the road?**  
Mean rating following the **Feedback Condition** = 3.25 (n = 12)

**Q. 27. SafeTRAC warned me of poor lane tracking only when I thought it was appropriate?**  
Mean rating following the **Feedback Condition** = 3.25 (n = 12)

**Q. 28. SafeTRAC helped me drive more safely?**

**Summary of results:** 5 drivers (42%) responded "yes". The remaining 7 drivers (58%) responded "no". Representative comments follow.

**Summarized comments from Drivers:**

**Driver:** No. I had to watch other drivers around me and adjust myself on the road according to other vehicles and construction. Therefore, crossing over the lines on the road or getting close to the lines—and my numerical tally reflected a bad score.

**Driver:** Yes. The warning was helpful.

**Driver:** Yes. I knew when to get off the road and get rest.

**Driver:** No. I could not alter driving habits.

**Driver** No. I would drive the same with or without SafeTRAC.

**Driver:** Yes. It made me more aware of my road position and let me know when it needed correcting.

**Driver:** Yes. It caught my attention and I adjusted.

**Driver:** Yes. It kept me aware of drifting. I tried harder to keep within the lanes.

**Q. 29. SafeTRAC helped me avoid a potential accident?**

**Summary of results:** All 12 drivers (100%) answered “no” to this question.

**Q. 30. SafeTRAC’s alertness index helped me decide when to take rest breaks?**

**Summary of results:** Two (2) drivers (16%) answered “yes” to this question; whereas 10 drivers (84%) answered “no” to this question.

**Summarized comments from 2 drivers:**

**Driver:** No. My 3’s were probably lower even when I was alert. I have driven for 18 years and I have always liked to run right on the right line. (Driver is inferring that hugging the right lane line would probably lower his SafeTRAC score on the display.)

**Driver:** No. I found myself pushing to get home or until I was too tired to go any farther.

**Q. 31. I would like SafeTRAC installed in my truck?**

**Summary of results:**

Answer Yes: 5 drivers

Answer No: 5 drivers

**Driver:** Yes. I like the device. Just need to pay less attention to it constantly.

**Driver:** Yes. Very useful, would make me an even safer driver than I am. This comes from someone with over 2 million accident free miles driving.

**Q. 32. I would recommend SafeTRAC to fellow truck drivers? \_\_\_\_ yes \_\_\_\_ no.**

**Summary Totals for Q. #32**

Answer Yes: 6 drivers

Answer No: 6 drivers

**Driver Comments:**

**Driver:** No. Although it was interesting - eventually it would not be noticed.

**Driver:** No. It works only on perfect road conditions. It would be nice to know where lane was I wet or fog conditions.

**Driver:** Yes. Good system once you get used to it. Beeping, scanning (almost novelty situation) then realize that it does keep you aware.

**Overall comments or recommendations regarding the SafeTRAC system?**

**Driver:** It picks up reflectors on the jersey wall, also wet tar strips, also rain wipes it out.

**Driver:** SafeTRAC picked up the tar strip on the road going west --- daylight into the sun --- as a line on the road. Theoretically, it would work but while driving on the road, we are experiencing the occasion to hug one line or the other, while passing or being passed to allow a safe cushioning between other vehicles on the road.

**Drivers:** Four drivers pointed out that the SafeTRAC does not work well in heavy rain.

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**SECTION D: CoPILOT (PERCLOS) MONITOR AND DROWSINESS DISPLAY**

Please rate the PERCLOS alertness index system

**Q. 33. The PERCLOS Eye Camera position on the truck dashboard distracted me?**

\_\_\_\_\_ yes    \_\_\_\_\_ no

**Summary for Q. No. 33:**

Answer YES: 6 drivers

Answer No: 6 drivers

**Driver comments:**

**Driver:** Yes. There were moments when I found it irritating or the worry of whether it was positioned properly.

**Driver:** Yes. Very much. The blinking distracted me far too much.

**Driver:** Yes. The red light in mine was very noticeable.

**Driver:** Yes. I watched it a lot to see if my eye shadow was in sight of the window. The red light is an attention getter.

**Driver:** Yes. Somewhat. If I try looking at it too long.

**Driver:** Yes. It caught my attention too much. I found myself looking at it.

**Driver:** No. It only took a couple of days to get used to it. But it only seemed to work after dark.

**Driver:** No. Perfect spot.

**Q. 34. The PERCLOS numeric display could be read easily? \_\_\_ yes \_\_\_ no.**

**Summary for Q. #34:** All 12 drivers (100%) answered “yes” to this question.

**Q. 35. PERCLOS Operation was consistent and understandable? \_\_\_\_\_ yes \_\_\_\_\_ no.**

**Summary for Q. #35:**

Answer Yes: 10 drivers

Answer No: 2 drivers

**Driver comments:**

**Driver:** No. It only worked after dark.

**Driver:** No. I had to keep adjusting so it was pointed correctly.

**Driver:** Yes. It said I was eye droppy, but I felt okay.

**Driver:** Yes. It took about two trips to figure it out.

**Use the following 1 to 5 rating scale to answer Q.s on the PERCLOS alertness index system (based on monitoring your eye lid droop)**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strong dislike/ Needs much improvement</b>	<b>Not satisfactory/ It needs some improvement</b>	<b>Neutral opinion about it</b>	<b>It's helpful/ I liked it</b>	<b>Very helpful/ I'd use it</b>

**Q. 36. The PERCLOS alertness index display was usually a pretty good match to the way I felt: alert or fatigued?** Use the scale of 1 2 3 4 5 (above)

**Mean rating following the Feedback Condition** (after completing 4 weeks of driving in the study) 12 drivers' responses rated an **average score of 3.33**

**Q. 37. PERCLOS alertness index digital display information was usually accurate/reliable**

**Summary Q. 37 data from Feedback Condition** (after completing 4 weeks of driving in the study) 12 drivers' responses rated an **average score of 3.42**

**Q. 38. Sometimes the display indicated my eyes were drooping, while I felt fully awake/alert on a scale of 1 2 3 4 5 (see above)**

**Summary Q. 38 data from Feedback Condition** (after completing 4 weeks of driving in the study) 11 drivers' responses rated an **average score of 3.00**. One driver left this question blank.

**Q. 39. The PERCLOS alertness index information was helpful to me in monitoring my own level of alertness and/or drowsy periods?** Use 1 2 3 4 5 (above)

**Summary Q. 39 data from Feedback Condition** (after completing 4 weeks of driving in the study) 12 drivers' responses rated an **average score of 2.75**.

**Q. 40. As PERCLOS monitored me for alertness and/or drowsy driving, it made me feel safer?** \_\_\_\_\_ yes \_\_\_\_\_ no

**Summary of Q. #40:**

Answer Yes: 1 driver

Answer No: 11 drivers

**Driver comments:**

**Driver:** No. This device kept me awake by the interference it made in my CB radio – I could not receive transmissions farther than 2 miles away.

**Driver:** No. Perhaps if it were available at my discretion.

**Driver:** No. It's too easy to ignore because of being used to it.

**Driver:** No. It's not the most impressive device but I do like the device.

**Driver:** No. There were times when I knew I was tired. I looked into the PERCLOS monitor and it showed 100%.

**Driver:** Yes. It could let me know when to take a break, or if I need to stop.

**Driver:** No. I'm just not sure about this product. Don't see much need for it in future.

**Driver:** No. I was not impressed with this device the way I was with SafeTRAC.

**Driver:** No. Because I kept going even knowing I was tired or exhausted. It would have to have a zapper on it to make me realize I had enough. And it was time to stop.

**Q. 41. I would like to have a PERCLOS Driver Alertness monitor in my truck?**

\_\_\_\_\_ Yes \_\_\_\_\_ No

**Summary of Q. #41:** All twelve (12) drivers (100%) answered "no" to this question.

**Driver comments:**

**Driver:** No. Too much fussing and adjusting.

**Driver:** No. Light distracts from driving. I don't think it was accurate.

**Driver:** No. Too many red flashing lights.

**Driver:** No. I thought the SafeTRAC was the better safety device.

**Driver:** No. Don't care for it.

**Driver:** No. Didn't seem to slow me down or make me want to stop. I just kept going driving drowsy.

**Q. 42. I would recommend the CoPilot PERCLOS Driver Alertness monitor to fellow drivers? \_\_\_\_\_ Yes \_\_\_\_\_ No**

**Summary of Q. #42:**

Answer Yes: 3 drivers

Answer No: 9 drivers

**Driver comments:**

**Driver:** Yes. After explaining its use, telling of the flashing lights.

**Driver:** Try it out. It's absolutely worth the knowledge.

**Q. 43. Driver's overall comments and recommendations on the CoPilot PERCLOS Driver Alertness Monitoring system:**

**Driver:** Eye monitor said I was in good shape but at the same time the watch said I should be tired. Sleep watch gave me a 100 a couple of days of sleeping.

**Driver:** It could be all in one unit.

**Driver:** This study is helpful on just a study of alertness.

**Driver:** You could get a good reading while you were tired by looking into the monitor and open your eyes wide.

**Driver:** I saw no usefulness with this monitor (PERCLOS)

**Driver:** The flashing red lights really bothered me

**Driver:** It needs a noise filter on the electric supply. Fed back into CB radio. Seriously, this is a problem that needs correcting.

**Driver:** It does not change the way I drive or the breaks I take.

**Driver:** I was not really all that impressed. If I could have one safety device it would be SafeTRAC. If I could have two it would be SafeTRAC + HPCS

**Driver:** Take it or leave it.

**Driver:** Make it a smaller system. All in one unit. Maybe hook up a light. Uncomfortable zap to the driver to tell him to stop (you're about to crash).

**Driver:** It would be nice to have the PERCLOS adjustable vertically. Need an adjustment knob on both sides.

**Driver:** PERCLOS (light?) catches my attention more than I want it too. The red flashing could be a distraction if one was to stare at it.

**Driver:** The percentage of eye alertness I was unable to try on semi-flat straight roads.

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**SECTION E: HOWARD POWER CENTER STEERING SYSTEM (HPCS):**

**Please rate the Howard Power Center Steering System (HPCS)**

**Q. 44. Operation of the HPCS was consistent and understandable? \_\_\_\_\_ yes \_\_\_\_\_ no.**

**Summary of Q. #44:** All twelve (12) drivers answered this question “yes.”

**Driver comments:**

**Driver:** Yes. Very simple to operate. Another driver said: Very easy to operate.

**Driver:** Yes. I had 1.5 weeks with it turned on, before it came apart. It was aligned and it still needed some adjustments.

**Driver:** Yes. Several drivers pointed out that when they had a repetitive driving route from the border between Ohio and Pennsylvania, eastward to Milesburg, PA, they encounter winding roads, with lots of curves in the road. So this they declared is not a good test of HPCS. We had to “overcome” HPCS on curves just a bit.

**Q. 45. The use and location of HPCS controls/displays were good? \_\_\_\_\_ yes \_\_\_\_ no**

**Summary of Q. #45:** Ten (10) of the 12 drivers answered this question with a “yes,” whereas two (2) drivers answered “no.”

**Driver comments:**

**Driver:** No. Trim button should be lit. I had trouble finding it in the dark.

**Driver:** Yes. Trim button needs a light.

**Driver:** No. My right knee hits the control box.

**Driver:** Yes. It really took a lot of “play” out of the wheel and very much complemented “SafeTRAC.”

**Driver:** Yes. Reflections on the windshield.

**Driver:** Yes. It could use a point of center type meter or gauge.

**Q. 45a. On average, at what pressure level did you set the HPCS to drive?  
\_\_\_\_\_ PSI in crosswinds? \_\_\_\_\_ PSI in more normal conditions?**

**Driver #031:** 145 PSI in cross winds  
145 PSI in normal conditions

**Driver #032:** 140 PSI in cross winds  
120 PSI in normal conditions

**Driver #033:** 150-160 PSI in cross winds  
120 PSI in normal conditions

- Driver #034:** 70 PSI in cross winds  
70 PSI in normal conditions; minimized HPCS because of winding roads
- Driver #035:** 180 PSI in cross winds  
180 PSI in normal conditions
- Driver #036:** 180 PSI in cross winds  
120 PSI in normal conditions
- Driver #037:** 130 PSI in cross winds  
130 PSI in normal conditions
- Driver #038:** 180 PSI in cross winds  
180 PSI in normal conditions
- Driver #039:** 120 PSI in cross winds  
120 PSI in more normal conditions
- Driver #040:** 130 PSI in cross winds  
110 PSI in more normal conditions
- Driver #041:** 145 PSI in cross winds  
160 PSI in normal conditions
- Driver #042:** 120-150 PSI in cross winds  
120-150 PSI in normal conditions

Q. 46. Was the HPCS steering assistance helpful in my driving? \_\_\_\_\_ yes \_\_\_\_\_ no.

**Summary of Q. 46:**

Answer Yes: 10 drivers

Answer No: 2 drivers

**Driver comments:**

**Driver:** Yes. There was a big difference with it on compared to having it off.

**Driver:** Yes VERY IMPRESSED !

**Driver:** Yes. I enjoyed the ease of control.

**Driver:** No. Road was too winding and HPCS was not helpful.

**Driver:** Yes. Only on straight away.

**Driver:** Yes. Took a lot of play out of steering wheel.

**Driver:** Yes. Made the truck much easier to keep in the lane and going down the road

**Driver:** Yes. Keeps rear trailer I drove from whipping. I predicted it would work well on triples; and double trailers.

**Driver:** Yes. I loved it Keeps me honest.

**Q. 47. HPCS made my driving workload easier \_\_\_\_ yes \_\_\_\_ no**

**Summary results:**

Answer Yes: 9

Answer No: 3

**Q. 48. I felt comfortable using the HPCS? \_\_\_\_ yes \_\_\_\_ no**

**Summary of Q. #48:**

Answer Yes: 9 drivers

Answer No: 3 drivers

**Driver comments:**

**Driver:** Yes. I had no problems with my truck.

**Driver:** Yes. After the first week it was very easy to operate, even in long turns.

**Driver:** No. It was not helpful due to curves and bends in road lucky to have 1 mile stretch.

**Driver :** No. I felt more control and a better feel of the road with the HPCS turned off

**Driver:** No. I had to fight too much steering wheel pressure in turns.

**Driver:** Yes. Very comfortable. Took about 5 trips to get comfortable

**Driver:** I don't believe HPCS will be that effective in our place of work. The turn button needs a light. Maybe make the trimming automatic, had to oversteer too much to set the trim where it needed to be causing me to zig-zag. I found out for myself best operating range for me with these road conditions was about 130 PSI.

**Q. 49. HPCS improved my truck steering or ability to maintain direction?**

\_\_\_\_\_ yes \_\_\_\_\_ no

**Summary of Q. #49:**

Answer Yes: 10 drivers

Answer No: 2 drivers

**Driver comments**

**Driver:** Yes. Definitely.

**Driver:** Yes. On straight roadway, it worked well. The more pressure setting the better it worked.

**Driver:** Yes. Only on straight roads. It took too much trimming in corners.

**Driver:** Yes. Going straight yes; going on curves, no.

**Driver:** No. Terrible control around curves.

**Driver:** Yes. Worked well in construction.

**Driver:** Yes. On the Ohio Turnpike which is fairly straight, I set it all the way up, and could maintain up to 98 for 20 miles.

**Q. 50. HPCS was helpful driving in crosswinds? \_\_\_\_\_ yes \_\_\_\_\_ no**

**Summary of Q. #50:**

Answer Yes: 8 drivers

Answer No: 4 drivers, each indicating they really did not encounter enough crosswinds to test the effectiveness of HPCS in crosswinds.

**Driver comments:**

**Driver:** Yes. You still had to be alert and make corrections, but I found this very definitely helped overall stability.

**Driver:** Yes. Go straight all of the time.

**Driver:** Yes. Far less work maintaining control.

**Driver:** Yes. It makes the job less stressful.

**Driver:** Yes. If you keep after the training.

**Driver:** Yes. Very helpful.

**Driver:** Yes. Did not have to constantly over-correct steering to keep the truck going in the right direction.

**Q. 51. HPCS always worked in a helpful manner? \_\_\_\_ yes \_\_\_\_ no**

**Summary of Q. #51:**

Answer Yes: 9 drivers

Answer No: 2 drivers

Answer blank: 1 driver

**Q. 52. How did HPCS affect my driving on curves?**

\_\_\_\_ helped \_\_\_\_ hindered \_\_\_\_ no effect noticeable

**Summary for Q. #52 (HPCS on curves):**

Answer helped: 2 drivers

Answer hindered: 7 drivers

Answer no effect noticeable: 2 drivers

Answer: both helped and hindered: 1 driver

**Driver comments:**

**Driver:** helped and hindered, a little of both. Lower pressure seemed to help.

**Q. 53. Was HPCS helpful driving in straight-aways?**

\_\_\_\_ helped \_\_\_\_ hindered \_\_\_\_ no effect noticeable

**Summary for Q. #53 (HPCS on straight-aways):**

Answer : all 12 drivers (100%) indicated it helped their driving in straight-aways.

**Q. 54. HPCS reduces driver fatigue? \_\_\_\_ yes \_\_\_\_ no**

**Summary for Q. #54 (HPCS reduces driver fatigue?):**

Answer yes: 9 drivers

Answer no: 3 drivers

**Driver comments:**

**Driver:** Yes. I found myself continually over-steering back and forth to correct the play and sensitivity in my normal power steering – with the HPCS on full pressure I had better control.

**Driver:** No Unable to draw conclusion based on my experience. Going on winding roads its not so good – Eastward. An awesome system on straight roads. He said he would like one on his truck.

**Driver:** No. Noticed no difference

**Driver:** No. In turns you either fight the pressure or do a lot of trimming, trim in turn, trim out of turn, trim in straight lanes

**Driver:** Yes. I had to run lower pressure on my run because of the curves higher pressure on straight

**Driver:** Yes. Even driving in a straight line is very physical. This took a lot of the work out of it.

**Driver:** Yes. System is great; if it worked all week.

**Q. 55. I would like HPCS in my truck? \_\_\_\_\_ yes \_\_\_\_\_ no**

**Summary for Q. #55:**

Answer Yes: 10 drivers

Answer No: 2 drivers

**Driver comments:**

**Driver:** Yes. This helped when I pulled 2 trailers around the same weight. Without HPCS these conditions are whipping back and forth or side to side continually.

**Driver:** Yes. I was impressed and would love to have one installed.

**Driver:** Yes. In cases where I ran on straighter roads.

**Driver:** No. I like the power steering for the feel of the road.

**Driver:** Yes. Maybe after using it for longer period of time.

**Driver:** Yes. Im going to be pulling triples soon. I think HPCS would take a lot of the trailer swing out of the 3 trailers.

**Driver:** Yes. Great on doubles (trailers) I believe it would be even better on triples.

**Driver:** Yes. Hate to do without it.

**Q. 56. I would recommend HPCS to other drivers? \_\_\_\_ yes \_\_\_\_ no**

**Summary for Q. #56:**

Answer Yes: 10 drivers

Answer No: 2 drivers

**Q. 57. Driver's overall comments or recommendations on the HPCS:**

**Driver:** I found this system to help out considerably. At first I was expecting a very big change – but as I got used to adjusting the pressure and conditions I felt it was very beneficial and safe. It helped in controlling whipping of 2 trailers and keeping the unit very straight on center going down the highway. – I will miss not having it.

**Driver:** GREAT PRODUCT!

**Driver:** This piece of equipment should be standard on any truck that pulls doubles or triples (trailers) because of the control it gives you over wiggle in your lane.

**Driver:** I believe I would love this system on straight roads.

**Driver:** Lights need to be brighter and one put in trim button.

**Driver:** Only good on straight roads.

**Driver:** I could see where big trucks it would be useful. These Trucks are bottom of the barrel quality. Steering not so good. All around good product.

**Driver:** It works better on straight roads but with lower pressure on the curves.

**Driver:** Liked it very much would like to see HPCS installed on all new CCX trucks coming into service.

**Driver:** Should be put on market for all trucks.

**Driver:** Compressor little noisy when first airing up. Maybe a center gauge so you know exactly when the piston is Center or you have more pressure on one side or other. Top dead center- or top dead middle – indicator.

**Driver:** Suggested HPCS would work better with a better steering system, such as on a Perterbilt truck, vice the Sterling trucks driven by Con-Way in this testing.

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**SECTION F: PSYCHOMOTOR VIGILANCE TEST (PVT) OF REACTION TIME:**

**Please Rate the Psychomotor Vigilance Test (PVT) of reaction time**

**Q. 58. I learned how to master the PVT pretty well, that is, I learned to consistently obtain pretty good reaction time scores? \_\_\_ yes \_\_\_ no.**

**Summary for Question #58:** 7 answers: Yes 5 answers: No

**Driver comments:**

**Driver:** Yes. P.V.T test gets to be boring sometimes felt as if I was rushing just to get it over with.

**Driver:** No. I often nodded off while using it.

**Driver:** Yes. If I wasn't too tired.

**Driver:** No. It made me realize just how tired I am after driving 44 hours straight.

**Driver:** No. Just when I thought I had it I did lousy.

**Q. 59. Was the PVT testing intrusive to my duty day? \_\_\_ yes \_\_\_ no.**

**Summary for Q. #59:** 7 Answered Yes 5 Answered No,

**Driver** comments:

**Driver:** Yes. At the Meet and Turn point, I am usually only there ten minutes.

**Driver:** Yes. The ten minutes at the end of the day was frustrating.

**Driver:** Yes. It got boring after a couple of days.

**Driver:** Yes. It took me out of my daily routine.

**Driver:** Yes. It was ten minutes I could have been working.

**Driver:** Yes. I thought I was not sleepy but had poor reaction times.

**Driver:** No. It was too long.

**Q. 60. Did the results of the PVT usually match my perception of my own reaction time?**

\_\_\_ yes \_\_\_ no

**Summary of Q. 60:** 10 Yes 2 No.

**Driver comments:**

**Driver:** Yes. Fairly close.

**Driver:** No. Reaction time on a machine does not match real life in my opinion.

**Driver:** Yes. The longer the day, the higher the score.

**Q. 61. When I got slower reaction times on the PVT, it reflected my own overall assessment of my condition (e.g. tired/fatigued)? \_\_\_ yes \_\_\_ no.**

**Summary of Q. #61:** 11 Yes 1 No.

**Driver:** No. I had a hard time with distractions and anxiety because I knew I would have to react 100 times.

**Driver:** Yes. I knew when I was tired, I would get slower reaction times.

**Driver:** Yes. Temporarily. Then I would pay more attention and get a better score.

**Driver:** Yes. Watching and waiting did have an effect on me.

**Driver:** Yes. Some of my times were 5 to 6 thousand; made me realize that I had microsleeps.

**Driver:** Yes. When tired, scores were higher.

**Driver:** Yes. Mornings were really bad.

**Driver:** After two weeks it became a chore. It was boring, the mind would wander, get tired of it. It's a true test of fatigue. It could be used as a Fitness for Duty Test, and that is why this driver gave the PVT device a score of 10 along with the other FMT devices in question No. 84. During the debrief interviews, four of the 12 drivers described the PVT as a very good device for testing a driver's Fitness for Duty testing of drivers.

**Q. 62. In my opinion the PVT could be used as a personal checking system on driver fitness for duty system (e.g. to check for a driver's readiness to drive as he/she reports for duty, or at rest stops half way through a long trip)? \_\_\_ yes \_\_\_ no**

**Summary of Q. #62:** 7 Yes; 4 No and 1 yes & no.

**Driver comments:**

**Driver:** Yes. Could possibly gauge a driver's condition.

**Driver:** Yes. This could be used on drivers trying to drive illegally (over the road drivers). Have them take this reaction test and the score determine if the truck would start or not.

**Driver:** No. It's just one more useless thing for a driver to do.

**Driver:** No. I don't think a machine could accurately tell me what I'm capable of.

**Driver:** No. Too boring.

**Driver:** Yes and no. As long as there was standard time for each individual. Some people are going to be faster than others.

**Q. 63. Driver's overall comments or recommendations about the PVT reaction time monitoring system?**

**Driver comments:**

**Driver:** Takes too long - not needed in our operation.

**Driver:** Very difficult to sit 10 minutes and remain alert.

**Driver:** I think its useless.

**Driver:** After two weeks it became a chore.

**Driver:** It became very boring – made me tired.

**Driver:** More variety on intervals required.

**Driver:** Made me more aware of how much or how little sleep I get.

**Driver:** Leave it to the college students.

**Driver:** Very boring after about 3 days. Make it faster, shorter, something other than just numbers, maybe different colored lights.

**Driver:** The reaction test gets boring after the second week

## **SECTION G: GENERAL QUESTIONS FOR DRIVERS AT END OF 4<sup>TH</sup> WEEK OF PARTICIPATION**

### **Q. 64. Driver's overall comments/recommendations about the testing, the alertness and fatigue management devices, driver fatigue, etc.**

#### **Driver Comments:**

**Driver:** It is very important that we all are rested and alert before driving an 80,000 lb unit down the highway. This testing and equipment reminds us all to be more alert and the fact that we are being monitored makes us aware to be conscious of our actions behind the wheel.

**Driver:** SafeTRAC could be more effective perhaps with different sound devices. HPCS – very impressed.

**Driver:** I think the SafeTRAC would be useful, if it gave a accurate reading of where you were in the lane. Use the PERCLOS for a chock block. Throw the watch away. And put HPCS on every truck.

**Driver:** Overall satisfied!!

**Driver:** Reaction test at one of day became rushed for me to get done so I could go home.

**Driver:** It took away too much of my attention needed for driving.

**Driver:** I do not think any of the devices will work for our line haul runs because all our runs are timed; you do not have time to stop and rest.

**Driver:** I got a lot out of the last 4 weeks. I would do it again if asked.

**Driver:** Good experiment, if the information and data obtained saves someone's life in the future. It would be satisfying to know I contributed to help someone down the road.

**Driver:** Excellent program should be done with everyone. Top management should be doing this. Sleep course or material should be given to every driver here! Mandatory.

**Driver:** It's been a very interesting 4 weeks. I learned a lot about managing my time, fatigue and ways to being better rested for work.

**Driver:** The last 2 weeks of keeping track of every minute of my day has made me realize just how little sleep I get.

**Driver:** Having monitor devices made me aware of habits. Information has been shared with other drivers. Each driver should do a fatigue study.

**Driver:** The electrical noise feedback to CB equipment was annoying.

**Driver:** I enjoyed being part of this program. Thank you.

**Q. 65 Overall, how useful/effective do you believe the idea of having Driver Alertness and Fatigue Management aids in the truck cab is for assisting you in managing your driving alertness and contributing to safe driving? Circle the one that applies and explain.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strong dislike/ Needs much improvement</b>	<b>Not satisfactory/ It needs some improvement</b>	<b>Neutral opinion about it</b>	<b>It's helpful/ I like it</b>	<b>Very helpful/ I'd Use it</b>

**Summary for Q. #65**

**Summary data from “With Feedback” condition, (after completing four weeks of driving in the study) 12 drivers’ responses rated an **average score of 3.75****

**Driver comments:**

**Driver:** 4 I liked the HPCS the best.

**Driver:** 3 With only two weeks to experiment, unsure.

**Driver:** 4 HPCS and SafeTRAC are helpful.

**Q. 66. Do you think other commercial drivers would benefit from fatigue management aids? \_\_\_\_\_ yes \_\_\_\_\_ no**

**Summary of Q. #66:** All 12 answered Yes.

**Driver Comments:**

**Driver:** Yes. HPCS & SafeTRAC

**Driver:** Yes. At least in a fatigue study.

**Driver:** Yes. Every driver, experienced or new, needs all the help they can get.

**Driver:** Yes. I have many drivers weaving back and forth in front of me while I am passing them. The HPCS would help them stay straight so others can safely go down the road. Without the HPCS, if you look in your mirror to the left – right, you have a tendency to go that way.

**Q. 67. At any time did your fatigue management and alertness monitoring systems shut down while driving during the on-the-road testing? \_\_\_\_\_ yes \_\_\_\_\_ no. If yes, what were the circumstances?**

**Summary of Q. #67:** 6 Yes and 6 No.

**Driver:** Yes. The SafeTRAC did not work in the rain where the lines on the road were faint in construction areas. It had a hard time picking up what to read: reflectors on jersey barriers, etc.

**Driver:** Yes. SafeTRAC wire on the camera was knocked off during the first week of the study.

**Driver:** Yes. A fuse came loose and I lost power to everything for about 20 minutes or so.

**Driver:** Yes. SafeTRAC did not work all the time. Even when there were good lines sometimes it would not work.

**Driver:** Yes. SafeTRAC did not work good in hard rain.

**Q. 68. Was there enough warning from the alertness monitoring devices' numeric displays to alert you to the fact you were driving while very drowsy and/or that you might be becoming too sleepy to continue driving safely? \_\_\_\_\_ yes \_\_\_\_\_ no**

**Summary for Q. #68:** 7 Yes, 5 No.

**Driver comments:**

**Driver:** Yes. In theory these work, but in reality it is a different story.

**Driver:** No. I rarely got very sleepy over in the 2-weeks period. I didn't wiggle enough to affect SafeTRAC, and the PERCLOS only dropped about 20 points.

**Driver:** Yes. Yes from All.

**Driver:** No. Eye monitor too late, late. Tracker too late, when it went off you were in trouble already in the adjacent lane.

**Driver:** No. Well rested before leaving.

**Driver:** Yes. The audio alert on the SafeTRAC did its job well.

**Q. 69. When you received low alertness, or drowsy driving indicators on the digital displays, did they generally seem to accurately match what you were experiencing in terms of drowsiness at the time? \_\_\_\_\_ Yes \_\_\_\_\_ No**

**Summary of Q. #69:** 8 Yes, 3 No and 1 Blank

**Driver comments:**

**Driver:** No. I really was never drowsy while driving.

**Driver:** No. SafeTRAC wasn't accurate enough, and PERCLOS would give low numbers from changing radio stations or getting in my lunch box.

**Driver:** blank. The Watch and Eye Monitor sometimes were conflicting with each other.

**Driver:** Yes. I like to hug the line, which brought my score on SafeTRAC down.

**Q. 70. Which system(s) matched your alertness level best? Rank them with a number 1 as best and 4 as the least helpful in matching your drowsiness level). And then tell us how you think the most effective ones did this?**

\_\_\_ PERCLOS \_\_\_ SafeTRAC \_\_\_ SleepWatch \_\_\_ PVT Reaction Time

**Driver #031:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 1 PVT  
I believe I had good reaction times when not distracted.

**Driver #032:** 4 PERCLOS 2 SafeTRAC 1 SleepWatch 1 PVT  
SleepWatch. To understand my sleep habits. PVT to understand how slow my reaction time was after 11 hours.

**Driver #033:** 2 PERCLOS 3 SafeTRAC 4 SleepWatch 1 PVT

**Driver #034:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 1 PVT

**Driver #035:** blank for PERCLOS & SafeTRAC X for SleepWatch blank for PVT

**Driver #036:** 3 PERCLOS 2 SafeTRAC 1 SleepWatch 4 PVT

**Driver #037:** 4 PERCLOS 2 SafeTRAC 1 SleepWatch 4 PVT  
SafeTRAC made aware of me on the road. I did like this, but it should be moved.

**Driver #038:** Blank for PERCLOS X for SafeTRAC Blank for SleepWatch & PVT  
Beeper and Percentage of alertness with the road.

**Driver #039:** 4 PERCLOS 1 SafeTRAC 2 SleepWatch 3 PVT

**Driver #040:** 1 PERCLOS 1 SafeTRAC 1 SleepWatch 4 PVT

**Driver #041:** 2 PERCLOS 3 SafeTRAC 3 SleepWatch 4 PVT

**Driver #042:** 2 PERCLOS 1 SafeTRAC 4 SleepWatch 4 PVT  
PVT just got boring, wanted to finish, didn't care about times.

**Q. 71. Which system(s) matched your drowsiness level best? Rank them with a number 1 as best and 4 as the least helpful in matching your drowsiness level). And then tell us how**

you think the most effective ones did this?

\_\_\_ PERCLOS \_\_\_ SafeTRAC \_\_\_ SleepWatch \_\_\_ PVT Reaction Time

**Explain:**

- Driver #031** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 1 PVT  
I did not get drowsy while driving
- Driver #032:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 1 PVT
- Driver #033:** 3 PERCLOS 2 SafeTRAC 4 SleepWatch 1 PVT
- Driver #034:** 4 PERCLOS 3 SafeTRAC 2 SleepWatch 1PVT
- Driver #035:** blank for PERCLOS X for SafeTRAC blank for SleepWatch & PVT
- Driver #036:** 4 PERCLOS 1 SafeTRAC 3 SleepWatch 4 PVT
- Driver #037:** 4 PERCLOS 1 SafeTRAC 2 SleepWatch 3 PVT  
As above, warning when going over the line
- Driver #038:** 2 PERCLOS 1 SafeTRAC 4 SleepWatch 3 PVT
- Driver #039:** 4 PERCLOS 1 SafeTRAC 2 SleepWatch 3 PVT
- Driver #040:** 1 PERCLOS 1 SafeTRAC 1 SleepWatch 4 PVT  
SafeTRAC alarm did its job when I was drowsy and drifting over the lane.
- Driver #041:** 3 PERCLOS 4 SafeTRAC 2 SleepWatch 1 PVT  
When the juice ran out of watch my juice was gone also.
- Driver #042:** 2 PERCLOS 1 SafeTRAC 4 SleepWatch 4 PVT

**Q. 72. During the on-the-road testing, was there anything in the fatigue management instrumentation that distracted you from performing your driving duties or interrupted your concentration on your driving tasks? \_\_\_\_\_ yes \_\_\_\_\_ no**

**Summary for Q. 72:** 7 Yes and 5 No.

**Driver Comments:**

**3 Drivers:** Yes. The PERCLOS – Flashing red lights; PERCLOS was too big and should be smaller.

**3 Drivers:** Yes. SafeTRAC beeping while in construction areas; SafeTRAC monitor should have been mounted in front of the driver, and use a color TV monitor instead.

**Driver:** Yes. All, only because I was not accustomed to them.

**Q. 73. Did you notice anything unsafe about the fatigue management equipment and systems installed in the cab of your truck?**

\_\_\_\_\_ yes \_\_\_\_\_ no. If yes, please describe what you considered was unsafe.

**Summary of Q. 73:** 1 Yes (position of SafeTRAC monitor) and 11 answered No.

**Q. 74. In design and use of fatigue management systems what needs to be changed? How? Why?**

**Driver:** PERCLOS needs to be adjustable vertically. PERCLOS needs to be a little smaller.

**Driver:** HPCS trim button being lighted and somewhere more accessible.

**Driver:** SafeTRAC needs better alignment to the lanes. SafeTRAC needs to be in front of the driver.

**Driver:** Locations of monitors and readouts to be less distracting.

**Driver:** Hide all answers.

**Driver:** Power supplies, keep them from interfering with C.B. radio and its power.

**Driver:** Everything provided did the job intended. I think everything worked well.

**Driver:** When I drove over rough roads, with potholes, jarring ruts, etc. this likely popped out my data care on the AP+ recorder and data were lost.

**Q. 75. What changes, if any, would you make to the testing procedures we employed with you during this project?**

**Drivers:** 5 wrote None, and said: Testing procedures were fine. None, very well conducted.

**Driver:** Shorten the PVT reaction test.

**Driver:** More time with the SafeTRAC system.

**Driver:** Extend it. I would have liked to drive this equipment with the tape of the displays a few more weeks.

**Driver:** Less time on these questions. Repeating questions.

**Q. 23. (No Feedback) and Q. 76 (after With Feedback). What are your opinions regarding ideas of placing driver drowsiness or fatigue monitoring systems into commercial trucks?**

**23. What are your opinions regarding ideas of placing driver alertness indicators, or drowsiness/fatigue detection systems into commercial trucks?**

**Answers to Q. 23:**

**Driver:** It will be beneficial.

**Driver:** Some systems could be more effective.

**Driver:** If the driver really wants help, they could be useful. But if he doesn't, he can just ignore them which renders them useless.

**Driver:** Could be very helpful. 3 wrote: Good idea. Keep it simple and small.

**Driver:** Drivers would disregard and go on to make more miles and more money.

**Driver:** Have the truck shut down after driver encounters two close calls.

**Driver:** I do not think it will make a difference.

**Driver:** I'll know better in two more weeks, but the SafeTRAC in my opinion is going to prevent the most accidents in commercial vehicles.

**Answers to Q. 76** (after the "With Feedback" condition (at end of 4 weeks).

**Driver Comments:**

**Driver:** Would be beneficial to those who do not get proper sleep.

**Driver:** During nighttime driving we clearly need systems to help. Finding a method of maintaining alertness would be helpful.

**Driver:** Maybe a voice-activated warning would be better.

**Driver:** 4 Drivers wrote good, or great idea as an aid. I like it.

**Driver:** I do not think that it would change the way you drive.

**Driver:** I think every truck should be equipped with SafeTRAC and HPCS.

**Driver:** Good idea – only the driver has to stop no matter what the monitor says.

**Q. 77. This question is about driver opinions regarding your alertness being monitored or your performance being recorded.**

In this study, for our research purposes, we obviously collected measurements of a) your *alertness* and/or *drowsiness*, the *amounts of sleep* you obtained or missed, and your driving performance data within the truck. As we promised, we will only describe those data in our reports with full respect of driver confidentiality, e.g. we will cite them in group statistics, etc.

You knew from the beginning of your participation, that we installed an Accident Prevention Plus (AP+) black box recording system in the truck, and it continuously recorded many parameters about the truck performance, your driving performance, and the alertness or drowsiness indicators from the fatigue management devices as well. **Note** this question was also asked as **Q. 24** after the first two weeks of driving with “No Feedback” condition.

The *prototype* driver alertness monitoring systems we provided you in this study (e.g. the SleepWatch, Lane Tracker, PERCLOS) are each meant to be the driver’s personal alertness monitoring systems, for his or her personal use only. At this point, they are not designed nor intended for capturing your performance data for use by any other person(s).

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**Since you knew that, the question is, did the idea of having your performance recorded for several weeks have any effects on your driving behavior, and performance?** \_\_\_\_\_ Yes, some effect \_\_\_\_\_ No effect \_\_\_\_\_ I’m not sure Please explain:

**Summary for Q. #24 (without displayed feedback):** 3 Yes some effect. 7 No Effect, 2 not sure

**Driver Comments:**

**Driver:** Yes, some effect. I drove safer and more aware of driving my truck properly.

**Driver:** Yes, some effect. At the start, yes it was distracting but after the first few days I was fine.

**Driver:** Yes, some effect. Pay more attention to my speed.

**Driver:** No effect. It didn’t bother me. I guess I didn’t care if I was being monitored.

**Driver:** No effect. You told me to drive like they weren’t there, so other than to point the SleepWatch to my face every day, I drove like there was nothing different about my truck.

**Driver:** No effect. I acted as if it wasn’t there.

**Driver:** I’m not sure. Only crossed my mind once or twice.

**Summary for Q. #77 (After With Feedback Condition):** 5 Yes, some effect 7 No Effect

**Driver comments:**

**Driver:** Yes, some effect. It made me aware of driving to the best of my ability. And being safer.

**Driver:** Yes, some effect. The first week I was unsure, but gradually felt comfortable.

**Driver:** Yes, some effect. Made me more aware to tune up some of my driving skills.

**Driver:** Yes, some effect. Tried to keep straight with SafeTRAC. Really helps. Love Howard Power Steering System.

**Driver:** No effect. I didn't care what was in the truck; it didn't bother me.

**Driver:** No effect. I drove as I always do.

**Driver:** No effect. I drive the way I drive. I'm safe and professional. That does not change whether I am being watched, taped, recorded or anything else.

**Driver:** No effect. I performed my job as I always did.

**Q. 25 (No Feedback Condition) and also Q. 78 (With Feedback Condition).**

**If use of fatigue management aids (like PERCLOS, SafeTRAC, or SleepWatch) or black box monitoring technologies (like our AP+ recorder) were made mandatory, by either government regulations or by trucking industry management, what is your opinion about how they should be used, or might work best? What operational or procedural considerations would they present to you as driver?**

**Q. 25, after "No Feedback" Condition,** (end of 1<sup>st</sup> 2 weeks),

**Driver comments:**

**Driver:** This would help us to be more aware of the necessity to be safer and create a better image to the general public about us recognizing we need to be safer on our highways.

**Driver:** I do not feel on a permanent basis. It would be appropriate.

**Driver:** I don't think anybody would like the black box. It's just too much like big brother always watching.

**Driver:** If I were aware they were in truck I would pay more attention to speed and safety.

**Driver:** Somehow forcing a driver to pull over and rest so truck is able to continue.

**Driver:** A 15-minute shut down period after getting safely off roadway.

**Driver:** I do not know what might work best but the log book is not good for keeping track of drivers because you can lie.

**Driver:** Even though I haven't used it yet, I am already sold on SafeTRAC. If it were made mandatory I would welcome it.

**Driver:** I would not like that because it could be used against a driver to terminate a driver.

**Driver:** No problem with it. Should keep tab on all functions, equipment as well as the driver alertness. Like having extra set of eyes on board. Help in any lawsuit because of an accident.

**Q. 78 After "With Feedback" Condition,** (end of 4 weeks),

**Driver Comments:**

**Driver:** I would like the HPCS system. – These other devices would be helpful in detecting and analyzing accidents – if they are made mandatory I will adjust accordingly.

**Driver:** Positively a NO on black box as permanent thing. I do not wish to have my life monitored.

**Driver:** There are too many improvements that need to be made before I could give an honest opinion.

**Driver:** optional only.

**Driver:** made sure I was good to go when I came to work.

**Driver:** distracting – everything should be hidden.

**Driver:** invasion of privacy could be a problem.

**Driver:** I feel you would have a troubled Drivers. Everyone drives tired especially at night time hours.

**Driver:** not sure.

**Driver:** I would not have a problem with any of the above.

**Driver:** As long as devices are used to aid a driver instead of terminating a driver it would be ok.

**Driver:** Monitoring box black no problem could help with lawsuits but should be optional no Government regulations!

**Q. 79. Did you have any law enforcement citations for moving violations during the last 2-week period while driving your truck? \_\_\_\_\_ yes \_\_\_\_\_ no If yes, please explain:**

**Summary for Q. #79:** 1 Yes and 11 No

**Driver #032:** yes, a speeding violation in the second week of the study

**Q. 80. Did you have any law enforcement citations for logbook violations during the last 2-week period while driving your truck? \_\_\_\_\_ yes \_\_\_\_\_ no If yes, please explain:**

**Summary for Q. #80:** 12 No.

**Q. 81. Were you involved in an accident or crash during the past 2-week period while driving your truck? \_\_\_\_\_ yes \_\_\_\_\_ no. If yes, please explain.**

**Summary for Q. #81:** 12 No

**Q. 82. Did you have any law enforcement citations for an action that occurred in the context of an accident during the last 2-week period while driving your truck? \_\_\_\_\_ yes \_\_\_\_\_ no If yes, please explain:**

**Summary for Q. #82:** 12 No.

**Q. 83. Are you willing to participate in a focus group session with other drivers, which would be held when all drivers have completed their participation in this study? The session is intended to increase our understanding of driver experience and reaction to the FMT devices. Any publication of the results of the focus group session will not identify individual drivers.**

**Summary for Q. #83:** 10 Yes and 2 No. Two drivers answering “Yes” indicated as long as they are paid for their time.

**Q. 84. Please think ahead with me for a few moments beyond the results of this field study. Assume for this question that we would be able to have some engineers and equipment designers make many of the important improvements and changes to the “fatigue monitoring devices” you have worked with these past four weeks ---- lets assume that we put many of the good suggestions you and your fellow drivers gave us into practice; that we had the devices all fixed up right, so that they worked well and were mounted properly into the cabs of the trucks. The question for you now is, how would you rank the items on a scale from “one” to “ten” in terms of how well you would like them for yourself and other truck drivers? Use the rank of “1” to mean “not good, don’t like or want it” and use the rank of “10” to mean it’s a terrific idea, and you would like to have one in your truck and/or think other drivers should want it too.**

Please rate each device on a scale of from “1” to “10”:

SleepWatch:\_\_\_\_\_ PERCLOS:\_\_\_\_\_

SafeTRAC:\_\_\_\_\_ HPCS: \_\_\_\_\_

Answers to Question #84 shown as raw data in table below.

**Q. 84 Table: Raw Data Rating Scores for each FMT Device (1 to 10 scale)\***

<b>USA</b>	<b>Fatigue Management Technologies</b>			
<b>Driver Number</b>	<b>CoPilot PERCLOS</b>	<b>SleepWatch</b>	<b>SafeTRAC</b>	<b>Howard Power Center Steering</b>
031	1	3	3	10
032	1	5	5	10
033	1	5	7.5	10
034	8	9	8	9
035	2.5	9	8	5
036	2	5	7	4
037	5	9	10	6
038	2	4	9	7
039	1	1	8	10
040	2	8	10	10
041	3	10	5	10
042	7	5	9	9
N=12	N=12	N=12	N=12	N=12
<b>Average Rating</b>	<b>2.96</b>	<b>6.08</b>	<b>7.46</b>	<b>8.33</b>
<b>Percent ≥ 9</b>	<b>0%</b>	<b>33%</b>	<b>33%</b>	<b>67%</b>

\* Use the rank of “1” to mean “not good, don’t like or want it” and use the rank of “10” to mean “it’s a terrific idea,” and you would like to have one in your truck and/or think other drivers should want it too.